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Summary

Employers pay for injuries that occur both on and off the job. In 1998–2000, motor vehicle crashes annually killed more than 2100 people while they were working and injured 353,000. Over half of the injuries forced people to miss work. Overall, on-the-job crash injuries (fatal and non-fatal) amounted to about 6.5 percent of all crash injuries.

Motor vehicle crash injuries on and off the job cost employers almost \$60 billion annually in 1998–2000. One third of this cost resulted from off-the-job injuries to workers and their dependents. Motor vehicle crashes imposed a \$16.3 billion health-related fringe benefit bill for employers. Employer health care (medical) cost of crash injuries was \$7.7 billion. Another \$8.6 billion was spent on sick leave and life and disability insurance for crash victims. Off-the-job crash injuries cost nearly \$13 billion, accounting for 80 percent of the health-related fringe benefit costs of motor vehicle crashes. Off-the-job crash injuries comprised an even larger share of employer health care costs (92 percent).

The annual employer cost of motor vehicle crashes in which at least one driver was alcohol-impaired is over \$9 billion, including wage-risk premiums. Restraint non-use by on-the-job employees cost employers over \$1 billion a year in fringe benefit costs. A larger \$3.9 billion employer bill results from restraint non-use by employees and their benefit-eligible dependents while away from work.

Employer costs of motor vehicle crash injuries vary widely by state and industry. These costs exceed \$3.5 billion in each of the nation's two most populous states—California and New York. Costs are highest in the agriculture, land transportation, heavy construction, and mining sectors. When comparing costs between states and industries, one should be aware that differences in injury severity, age of workforce, regional and local characteristics, and completeness of reporting play a significant role in the variance.

Prevention is an important way to control health care costs arising from injuries. This report demonstrates that by increasing restraint use and reducing alcohol-impaired driving, the potential health care savings are large. Motor vehicle injury costs to employers are reported on a nationwide, state-by-state, and industry basis. The report updates the national estimates of employer costs of crashes presented in NHTSA's report ***“What Do Traffic Crashes Cost? Total Cost to Employers by State and Industry” (1996)*** and adds estimates of alcohol involvement and restraint non-use.

Employer's Motor Vehicle Crash Costs (In millions of 2000 dollars)

	CRASH INJURY		
	On-the-Job	Off-the-Job	All
Health Fringe Benefit Costs	\$3,400	\$12,900	\$16,300
Nonfringe Costs	\$18,600	\$6,600	\$25,200
SUBTOTAL	22,000	19,500	41,500
Wage-Risk Premiums	\$18,400	\$0	\$18,400
TOTAL	22,000	19,500	41,500

Conclusions

Traffic safety programs are an alternative to reduce health care expenses to employers without reducing the benefits offered to employees. Protecting employees from motor vehicle crash injury can be a profitable investment of time and resources. Totally eliminating alcohol-impaired and unrestrained driving would save employers \$15 billion annually.

Methods

A number of different sources were used to develop the estimates. These included NHTSA's 1998–2000 Fatality Analysis Reporting System (FARS); the U.S. Bureau of Labor Statistics' 2000 Census of Fatal Occupational Injuries (CFOI); the U.S. Bureau of Labor Statistics' 2000 Survey of Occupational Injury and Illness (SOII); the 1987–1992 National Health Interview Survey; NHTSA's *The Economic Impact of Motor Vehicle Crashes, 2000*; and NHTSA's *The Cost of Injuries to Employers: A NETS Compendium, 1996*. Employer crash costs were adjusted to specific states using ratios of state to national costs. Medical and composite item state price adjusters were calculated from the ACCRA Cost of Living Index. A wage adjuster was calculated from estimates of personal income per capita by state in the 2000 Statistical Abstract of the United States.

What Do Traffic Crashes Cost?

Total Costs to Employers by State and Industry.

Recent publicity has focused on corporate layoffs as a cost-cutting tool. Debate has contrasted the “bottom line” with “corporate responsibility.” Injuries account for a substantial portion of health-related costs. This report shows that by preventing motor vehicle crashes, the potential health care savings are large. Motor vehicle injury costs to employers are included in this report on a nationwide, state-by-state, and industry basis. The report updates the national estimates of employer costs of crashes presented in NHTSA’s report “*What Do Traffic Crashes Cost? Total Cost to Employers by State and Industry (1996)*” and adds estimates of alcohol involvement and restraint non-use.

Costs Covered by Employers

Employer costs resulting from motor vehicle crashes fall into three categories: Health fringe benefit costs, non-fringe costs, and wage premiums.

Health fringe benefit costs are the costs of fringe benefits paid because of illness and injury of employees and their dependents. They cover contributions to Workers’ Compensation medical and disability insurance, health insurance, sick leave, Social Security disability insurance, life insurance, and private disability insurance, as well as insurance administration and overhead.

Non-fringe costs include motor vehicle property damage and liability insurance, crash-related legal expenses, and the costs of unreimbursed vehicle damage and replacement. In addition, employers pay taxes to help fund police, fire, and ambulance services. Employers also lose productivity when employees suffer injuries preventing them or their co-workers from working at full capacity. Recruiting and training workers to replace fatally injured or permanently disabled employees raises the bill employers pay for injuries.

Finally, employers pay **wage premiums** to workers for accepting risky jobs. Individual workers and their families bear the pain, suffering and quality-of-life losses associated with workplace injury. Wage premiums for risk-taking can be viewed as payments in advance for possible future losses caused by injury. These payments are not necessarily paid to all workers in high risk jobs. Miller (1990) identifies 30 credible studies showing the average amount paid.

Employer Costs Extend Beyond the Company Door

Employers pay for injuries that occur to their employees on and off the job and to their dependents. They also pay for harm caused to non-employees involved in commercial crashes (crashes involving a vehicle on employer business). In 1998–2000, motor vehicle crashes annu-

Table 1
Annual Number of Injuries of Workers
and Their Dependents Due to Motor
Vehicle Crashes – 1998–2000

	INJURIES			
	On-the-job	Off-the-job in commercial crash	Other Off- the-job	All
Fatal	2,114	88	40,593	42,795
Nonfatal	353,000	265,000	4,767,000	5,385,000
Lost Work Day	187,000	141,000	2,527,000	2,855,000
Non Lost Work	166,000	125,000	2,241,000	2,532,000
Total	355,114	265,088	4,807,593	5,427,795

ally killed an estimated 2,114 people while they were working and injured 353,000. As Table 1 shows, over half of the injuries forced people to miss work. Overall, on-the-job crash injuries (fatal and non-fatal) amounted to about 6.5 percent of all crash injuries.

The 2000 economic costs of U.S. highway crashes, excluding the cost imposed on society by travel delays and wage-risk premiums, was \$205 billion (Blincoe et al., 2002). Employers pay 20 percent of these costs. They share the costs of highway crashes with government, insurers, and individual crash victims.

Table 2
Employer's Motor Vehicle
Crash Costs
(In Millions of 2000 Dollars)

	CRASH INJURY		
	On-the-Job	Off-the-Job	All
Health Fringe Benefit Costs	\$3,400	\$12,900	\$16,300
Nonfringe Costs	\$18,600	\$6,600	\$25,200
SUBTOTAL	22,000	19,500	41,500
Wage-Risk Premiums	\$18,400	\$0	\$18,400
TOTAL	40,400	19,500	59,900

Motor vehicle crash injuries on and off the job cost employers almost \$60 billion annually in 1998–2000. Of that, \$41.5 billion was comprised of fringe and non-fringe benefit costs and another \$18.4 billion was in the form of wage-risk premiums (Table 2). Nearly half of the combined fringe and non-fringe costs resulted from off-the-job injuries to workers and their dependents.

Employer Health Fringe Benefit Spending

Motor vehicle crashes imposed a \$16.3 billion health fringe benefit bill on employers (Table 3). Employers' health care (medical) costs of crash injuries were \$7.7 billion. Table 3 illustrates the importance of off-the-job injuries to employers interested in achieving

health-related cost savings. Off-the-job crash injuries cost nearly \$13 billion, or 80 percent of motor vehicle crash health-related fringe benefit costs. Off-the-job crash injuries comprised an even larger share of employer health care cost (92 percent). Motor vehicle crashes accounted for 4.4 percent of employer health-related fringe benefit cost (Figure 1).

Traffic Safety Programs Can Produce Savings

Employer costs per on-the-job crash, per on-the-job crash injury, and per million vehicle miles of travel enable employers to estimate their injury burden and the potential savings of traffic safety programs. These unit costs are averages calculated from total costs and actual incidence. Employers can estimate their cost burden by multiplying the costs in Table 4 by either their total crashes, crash injuries, or millions of vehicle miles of travel. For example, the estimated direct cost of on-the-job crashes for a company that had 100 such crashes would be $100 \times \$16,471 = \$1,647,100$.

Table 3

Employer Health-Related Fringe Benefit Costs from Motor Vehicle Crashes
(In Millions of 2000 Dollars)

	Crash Injuries		
	On-the-job	Off-the-job	All
Workers Compensation	\$2,060	\$0	\$2,060
Medical	\$550	\$0	\$550
Disability	\$1,510	\$0	\$1,510
Health Insurance & Self Pay	\$40	\$7,150	\$7,190
Disability Insurance	\$80	\$720	\$800
Life Insurance	\$50	\$560	\$610
Insurance Administration	\$260	\$720	\$980
Insurance Overhead	\$330	\$20	\$350
Social Security	\$100	\$1,390	\$1,490
Sick Leave	\$470	\$2,360	\$2,830
TOTAL	\$3,390	\$12,920	\$16,310

Figure 1

Motor Vehicle Injury's Contribution to Health Fringe Benefit Costs

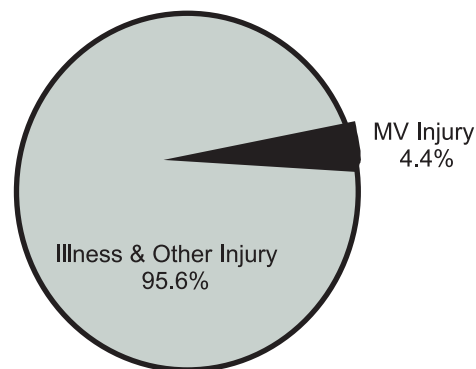


Table 4

Costs to Employers per Million Vehicle Miles of Travel (M VMT) and Costs per On-the-Job Highway Crash and Injury

	Per M VMT	Per Crash	Per Injury	Per Fatality	Per Nonfatal Injury
Health Fringe Benefit Costs	32,976	3,570	23,865	314,284	22,126
Other Direct Costs	64,858	6,699	20,432	158,108	19,608
Liability for Losses by Others	60,043	6,202	32,016	32,016	32,016
SUBTOTAL	157,878	16,471	76,313	504,408	73,750
Wage-Risk Premium	78,083	8,065	51,865	3,306,430	32,374
TOTAL	235,961	24,536	128,178	3,810,838	106,124

*Includes fatal and nonfatal injuries.

Including wage-risk premiums, on-the-job highway crashes cost employers over \$24,500 per crash, nearly \$236,000 per million vehicle miles of travel (M VMT), and over \$128,000 per injury. NHTSA reports that safety elements effective in reducing losses associated with motor vehicle crashes include top-level management commitment to traffic safety programs, mandatory safety restraint policies, alcohol and drug non-use policies, Employee Assistance Programs, and safety outreach that extends safety efforts beyond the company door.

Tables 5 and 6 show what restraint non-use costs employers. Restraint non-use by on-the-job employees cost employers over \$1 billion a year in fringe and non-fringe costs and a similar amount in wage-risk premiums. A larger \$3.9 billion employer bill results from restraint non-use by employees and their benefit-eligible dependents while away from work. Fringe and non-fringe costs per employee

Table 5

Employer's Costs of Safety Belt Non-Use (In millions of 2000 dollars)

	Highway Crash		
	On-the-job	Off-the-job	All
Health Fringe Benefit Costs	\$776	\$2,924	\$3,700
Nonfringe Costs	\$276	\$967	\$1,243
SUBTOTAL	\$1,053	\$3,890	\$4,943
Wage-Risk Premiums	\$1,077	\$0	\$1,077
TOTAL	\$2,129	\$3,890	6,019

Table 6

Employer's Costs per Person Involved in Crash

	On-the-Job		Off-the-job	
	Unrestrained	Restrained	Unrestrained	Restrained
Health Fringe Benefit Costs	7,020	1,580	2,500	450
Nonfringe Costs	20,730	9,730	480	150
SUBTOTAL	27,750	11,310	2,980	600
Wage-Risk Premiums	22,420	2,930	-	-
TOTAL	50,170	14,240	2,980	600

involved in a crash on the job average \$27,750 unrestrained, far exceeding the \$11,310 cost if restrained. The comparable figures for crashes off the job are \$2,980 versus \$600.

The annual employer cost of motor vehicle crashes in which at least one driver was alcohol-impaired is over \$9 billion, including wage-risk premiums (Table 7). Out of this, \$3.1 billion comes from job-related alcohol involvement.

Table 7
Employer's Costs of Alcohol-Involved
Motor Vehicle Crashes
(In millions of 2000)

	Highway Crash		
	On-the- job	Off-the- job	All
Health Fringe Benefit Costs	\$392	\$4,977	\$5,369
Nonfringe Costs	\$1,499	\$978	\$2,477
SUBTOTAL	\$1,892	\$5,954	\$7,846
Wage-Risk Premiums	\$1,232	\$0	\$1,232
TOTAL	\$3,124	\$5,954	\$9,078

Employer Costs of Crashes by State

Table 8 details employer costs of motor vehicle crash injuries, on- and off-the-job, by state. Costs per employee vary widely by state. Differences in injury severity, age of workforce, regional and local characteristics, and completeness of reporting cause the variance. Critically, the methods for calculating state costs (documented in the Appendix) ignore differences in non-fatal injury severity between states. This weakness probably produces cost estimates that are too low in rural states relative to urban states, which typically have lower average speeds and consequently less severe injuries.

Differences in labor force participation rates and family size between states could cause employer costs per em-

ployee to vary even if safety levels and prices were equal. Cost differences between states may reflect price and income variations more than differences in safety. Finally, differences between states may result from differing completeness of reporting of occupational or crash injuries rather than actual differences in injury rates.

Table 9 provides estimates of employer costs of alcohol-involved injuries by state. These estimates account for regional differences in alcohol-impaired driving. They were obtained by assuming that the ratio between employers' and society's costs of alcohol use remain the same across the states.

Employer Costs of Crashes by Industry

Employer costs of on-the-job motor vehicle crashes by industry are shown in Table 10. As expected, costs per employee are higher for industries where motor vehicles are used intensively. The highest costs per employee are in agriculture and forestry, land transportation, mining, heavy construction, and automotive sales and repair. Costs were assigned by vehicle type involved in the crash. Heavier vehicles have smaller fatality costs but higher property damage costs. The SOII obtained reports on less than 30 percent of occupational crash survivors with work loss. We used the reported cases to infer the distribution of unreported cases. Thus, cost variations between industries should be compared cautiously. They may result from differing completeness of reporting.

Conclusions

Employer health care (medical) spending for motor vehicle crashes was \$7.7 billion in 2000. Another \$8.6 billion was spent on sick leave and life and disability insurance for crash victims. Traffic safety programs are an alternative to reduce these costs without reducing the benefits offered to employees.

Protecting employees from motor vehicle crash injury can be a profitable investment of time and resources. Totally eliminating alcohol-impaired and unrestrained driving could reduce employer costs by \$15 billion annually.

Developing a proactive traffic safety program is one of the best ways to control costs from workplace vehicle crashes. A blueprint for such a program can be found in the Network of Employers for Traffic Safety (NETS) Traffic Safety Primer, which suggests the following 10 steps to improve safety and minimize crash risk:

1. Senior Management Commitment
2. Written Policies and Procedures
3. Driver Agreements
4. Motor Vehicle Registration Checks
5. Crash Reporting and Investigation
6. Vehicle Maintenance and Inspection
7. Disciplinary Action System
8. Reward/Incentive Program
9. Driver Training/Communication
10. Regulatory Compliance

Table 8
Annual Employer Costs of On- and Off-the-Job Motor Vehicle Crash Injuries by
Expense Category by State
(In millions of 2000 Dollars)

State	EXPENSE CATEGORY		Total	Per Employee	State	EXPENSE CATEGORY		Total	Per Employee
	Health Fringes	Non-Fringe				Health Fringe	Non-Fringe		
USA	\$16,294	\$25,200	\$41,494	\$340	MS	\$149	\$222	\$371	\$320
AK	\$38	\$51	\$89	\$320	MT	\$50	\$69	\$119	\$290
AL	\$189	\$277	\$466	\$240	NC	\$570	\$935	\$1,505	\$440
AR	\$146	\$216	\$362	\$320	ND	\$20	\$29	\$49	\$150
AZ	\$328	\$471	\$799	\$430	NE	\$109	\$183	\$292	\$340
CA	\$1,470	\$2,257	\$3,727	\$260	NH	\$45	\$68	\$113	\$190
CO	\$148	\$211	\$359	\$190	NJ	\$748	\$1,242	\$1,990	\$540
CT	\$244	\$402	\$646	\$400	NM	\$103	\$150	\$253	\$350
DC	\$55	\$89	\$144	\$500	NV	\$143	\$204	\$347	\$470
DE	\$48	\$75	\$123	\$340	NY	\$1,984	\$3,034	\$5,018	\$630
FL	\$999	\$1,556	\$2,555	\$400	OH	\$753	\$1,261	\$2,014	\$390
GA	\$569	\$852	\$1,421	\$420	OK	\$189	\$280	\$469	\$320
HI	\$49	\$78	\$127	\$230	OR	\$134	\$186	\$320	\$210
IA	\$149	\$237	\$386	\$260	PA	\$502	\$812	\$1,314	\$240
ID	\$65	\$92	\$157	\$280	RI	\$66	\$97	\$163	\$350
IL	\$265	\$411	\$676	\$120	SC	\$229	\$340	\$569	\$330
IN	\$307	\$492	\$799	\$280	SD	\$34	\$48	\$82	\$230
KS	\$127	\$186	\$313	\$250	TN	\$293	\$463	\$756	\$300
KY	\$54	\$52	\$106	\$60	TX	\$1,390	\$2,130	\$3,520	\$400
LA	\$310	\$480	\$790	\$440	UT	\$122	\$178	\$300	\$320
MA	\$463	\$714	\$1,177	\$390	VA	\$349	\$567	\$916	\$280
MD	\$302	\$497	\$799	\$310	VT	\$17	\$22	\$39	\$130
ME	\$74	\$108	\$182	\$320	WA	\$414	\$584	\$998	\$390
MI	\$576	\$890	\$1,466	\$330	WI	\$269	\$421	\$690	\$260
MN	\$204	\$301	\$505	\$210	WV	\$96	\$148	\$244	\$340
MO	\$315	\$485	\$800	\$310	WY	\$31	\$42	\$73	\$310

Table 9
Employer's Costs of On- and Off-the-Job
Alcohol-Involved Motor Vehicle Crashes by State
(In millions of 2000 Dollars)

State	Total Cost	State	Total Cost
USA	\$7,846	MS	\$98
AK	\$23	MT	\$46
AL	\$187	NC	\$248
AR	\$82	ND	\$13
AZ	\$174	NE	\$51
CA	\$789	NH	\$22
CO	\$127	NJ	\$167
CT	\$67	NM	\$79
DC	\$114	NV	\$77
DE	\$28	NY	\$336
FL	\$512	OH	\$336
GA	\$222	OK	\$97
HI	\$28	OR	\$55
IA	\$64	PA	\$337
ID	\$43	RI	\$44
IL	\$317	SC	\$139
IN	\$159	SD	\$26
KS	\$64	TN	\$158
KY	\$104	TX	\$678
LA	\$192	UT	\$39
MA	\$124	VA	\$168
MD	\$113	VT	\$13
ME	\$32	WA	\$221
MI	\$280	WI	\$162
MN	\$120	WV	\$63
MO	\$187	WY	\$18

Table 10
Costs of On-the-Job Motor Vehicle Crashes to Employers by Industry
(In 2000 Dollars)

	EXPENSE CATEGORY				
Industry	Health Fringe	Non Fringe	Total	Cost Per Employee	Wage Premium
Agriculture, Forestry & Fishing	\$277,885,443	\$1,290,837,485	\$1,568,722,928	\$453	\$1,749,049,853
Mining	\$16,369,033	\$48,125,852	\$64,494,885	\$113	\$132,221,563
Metal Mining	\$4,408,037	\$20,472,184	\$24,880,221	\$478	\$27,749,071
Coal Mining	\$1,259,012	\$8,379,667	\$9,638,679	\$96	\$5,276,962
Oil & Gas Extraction	\$2,279,053	\$10,585,254	\$12,864,307	\$41	\$14,346,174
Nonmetallic Minerals	\$594,748	\$3,958,493	\$4,553,241	\$42	2,492,798
Construction	\$347,443,652	\$1,787,945,883	\$2,135,389,535	\$395	\$2,004,879,473
Gen'l Building Contractors	\$38,006,138	\$207,361,573	\$245,367,711	\$199	\$206,987,089
Heavy Construction	\$111,493,149	\$517,914,025	\$629,407,174	\$824	\$701,748,826
Special Trades Contractors	\$195,756,006	\$1,061,347,946	\$1,257,103,952	\$368	\$1,073,120,885
Manufacturing	\$275,694,622	\$1,474,143,381	\$1,749,838,003	\$96	\$1,532,899,724
Food & Kindred Products	\$39,834,421	\$226,976,044	\$266,810,465	\$161	\$206,862,520
Textile Mill Products	\$27,744,608	\$184,661,128	\$212,405,736	\$334	\$116,287,408
Lumber & Wood Products	\$52,963,701	\$246,034,057	\$298,997,758	\$391	\$333,354,336
Printing & Publishing	\$34,168,702	\$181,765,399	\$215,934,101	\$141	\$190,960,724
Chemicals & Allied Products	\$12,531,472	\$49,172,372	\$61,703,844	\$60	\$88,328,600
Primary Metal Industries	\$569,221,114	\$3,779,098,254	\$4,348,319,368	\$6,168	\$2,395,735,707
Fabricated Metal Products	\$19,944,608	\$113,761,656	\$133,706,264	\$92	\$103,450,608
Industrial Machinery & Equip.	\$1,330,289	\$91,618,964	\$107,949,253	\$52	\$86,300,642
Transportation Equipment	\$29,783,744	\$198,233,104	\$228,016,848	\$129	\$124,834,144
Transportation & Public Utilities	\$679,288,315	\$3,440,029,627	\$4,119,317,942	\$652	\$3,977,887,395
Local & Interurban Trans.	\$61,659,504	\$343,930,629	\$405,590,133	\$899	\$327,945,704
Trucking & Warehousing	\$416,017,830	\$1,932,494,656	\$2,348,512,486	\$1,251	\$2,618,471,682
Water Transportation	\$12,675,084	\$84,362,169	\$97,037,253	\$564	\$53,125,734
Transportation by Air	\$150,573,485	\$992,586,102	\$1,143,159,587	\$1,350	\$641,139,719
Transportation Services	\$12,327,504	\$82,048,764	\$94,376,268	\$214	\$51,668,904
Communications	\$26,973,894	\$160,497,374	\$187,471,268	\$135	\$132,964,541
Electric, Gas & Sanitary Serv.	\$39,067,261	\$185,893,941	\$224,961,202	\$251	\$241,273,944
Wholesale Trade	\$261,910,206	\$1,547,238,067	\$1,809,148,273	\$275	\$1,302,720,331

Table 10
Costs of On-the-Job Motor Vehicle Crashes to Employers by Industry
(In 2000 Dollars)

	EXPENSE CATEGORY				
Industry	Health Fringe	Non Fringe	Total	Cost Per Employee	Wage Premium
Retail Trade	\$270,745,595	\$1,525,233,036	\$1,795,978,631	\$83	\$1,424,271,752
General Merchandise Stores	\$37,653,663	\$239,213,395	\$276,867,058	\$102	\$169,742,735
Food Stores	\$54,010,025	\$330,520,922	\$384,530,947	\$111	\$256,659,899
Automotive Dealers	\$66,599,129	\$376,596,424	\$443,195,553	\$195	\$348,870,208
Apparel & Accessory Stores	\$2,000,516	\$13,314,931	\$15,315,447	\$14	\$8,384,866
Furniture & Home Furnishings	\$12,979,253	\$74,963,916	\$87,943,169	\$90	\$66,347,483
Eating & Drinking Places	\$27,326,131	\$157,204,589	\$184,530,720	\$26	\$140,336,750
Finance, Insurance & Real Estate	\$55,854,226	\$333,738,674	\$389,592,900	\$56	\$273,861,948
Services	\$618,256,266	\$3,649,011,861	\$4,267,268,227	\$124	\$3,078,656,949
Hotels	\$25,296,100	\$168,364,475	\$193,660,575	\$115	\$106,024,850
Personal Services	\$19,346,534	\$109,754,412	\$129,100,946	\$110	\$100,971,726
Business Services	\$156,098,447	\$896,645,236	\$1,052,743,683	\$147	\$803,100,028
Automotive Repair	\$86,588,195	\$507,772,857	\$594,361,052	\$545	\$434,602,767
Amusement & Recreation Serv.	\$27,007,464	\$170,071,318	\$197,078,782	\$130	\$174,289,179
Health Services	\$114,377,201	\$885,474,006	\$999,851,207	\$105	\$620,083,326
Legal Services	\$1,196,052	\$9,861,819	\$11,057,871	\$12	\$6,053,938
Educational Services	\$7,361,796	\$60,700,287	\$68,062,038	\$34	\$37,262,474
Social Services	\$63,936,318	\$507,953,443	\$571,889,761	\$239	\$337,352,188
Membership Organizations	\$9,206,500	\$49,499,183	\$58,705,683	\$27	\$65,468,343
Engineering & Management	\$33,176,948	\$239,972,187	\$273,149,135	\$94	\$191,920,117
Government	\$515,333,609	\$3,671,795,796	\$4,187,129,405	\$215	\$3,020,839,880
Federal Government	\$94,224,865	\$671,357,014	\$765,581,879	\$278	\$552,340,059
State Government	\$100,946,729	\$719,257,088	\$820,203,817	\$177	\$591,738,582
Local Government	\$309,017,515	\$2,201,774,629	\$2,510,792,144	\$208	\$1,811,434,279
TOTAL	\$3,318,781,067	\$18,768,099,662	\$22,086,880,729	\$180	\$18,497,288,868

Appendix

Incidence Estimation

Both fatal and non-fatal motor vehicle crash injuries were estimated by state and industry. The state fatality estimation used two data sets: NHTSA's 1998–2000 FARS and the U.S. Bureau of Labor Statistics' 2000 Census of Fatal Occupational Injuries (CFOI).

Occupational fatalities by state generally are the CFOI motor vehicle fatality count. To reduce the effects of random variation with very small sample sizes, if the CFOI state count was less than nine, the 1998–2000 average of occupational motor vehicle traffic fatalities from FARS was used instead. This resulted in an estimated 2114 U.S. on-the-job motor vehicle fatalities. Off-the-job motor vehicle-related fatalities were computed by subtracting the state occupational highway fatality estimates from the 1998–2000 FARS state totals (all ages). The calculations assumed that all people under age 65 are workers or dependents.

The number of non-fatal occupational motor vehicle injuries was computed using four data sources: the 1998–2000 FARS, the 2000 police-reported state non-fatal injury counts (Blincoe et al, 2002), the 2000 CFOI, and the National Health Interview Survey (NHIS) 1987–1992. (The NHIS is a nationwide sample of civilian households. It includes information on injuries, whether they were on-the-job, and where they occurred.)

The number of injured on-the-job motor vehicle crash survivors by state was computed in four stages. The computation started from state counts of police-reported crash survivors, adjusted for police under-reporting of injury. The police reports documented an estimated 80 percent of the total injury victims (Blincoe et al, 2002). From these injury counts and FARS fatality counts, the number of injured crash survivors per crash fatality by state was computed. That ratio was multiplied by the CFOI count of occupational motor vehicle fatalities by state. (This calculation assumes that the percentage of crash fatalities on public roads, 81percent, matches the NHIS percentage of on-the-job crash survivors who were injured on public roads.) Finally, the resulting estimates were multiplied by the percentage of injured survivors of motor vehicle crashes on public roads who were injured on the job divided by the percentage of motor vehicle crash fatalities on public roads who died on the job. The percentage of survivors, 5.25 percent, came from the NHIS. The percentage of deaths, 4.3 percent, was computed by dividing the CFOI count by the FARS count.

To distribute the injured survivors of on-the-job crashes by industry, the SOII distribution of survivors of lost-workday occupational injuries by two-digit Standard Industrial Classification Code was used. The SOII excludes medically treated survivors without workdays lost, whom the NHIS estimates are 41.5 percent of the total. It also does not cover all workers. Notably, it excludes government workers and self-employed truck and taxi drivers. (To estimate injury sur-

vivors in the government sector, the number of survivors per motor vehicle fatality for the service sector was multiplied by the CFOI motor vehicle fatality count for government employees.) Beyond its under-coverage problem, the SOII appears to under-count motor vehicle crash injuries. It records only 50,336 of the estimated 195,000 injured survivors of on-the-job crashes.

This update relies on CFOI data to calculate on-the-job motor vehicle fatalities. In previous estimates, the CFOI was used in conjunction with the FARS to estimate on-the-job fatalities. The CFOI has increasingly been accepted as a reliable source of fatality counts. Relying on the CFOI data results in a decrease in the estimated number of occupational fatalities (and the associated costs) from prior reports. The decrease does not indicate a trend in the number of fatalities.

Incidence of commercial vehicle crashes used to calculate cost per crash was estimated from aggregated data purchased from the Insurance Services Office (ISO). Commercial vehicle miles traveled were estimated from two sources. Total vehicle miles traveled in 1994 (2,750 billion) is from *Traffic Safety Facts, 2000*. The percentage of vehicle miles driven by commercial vehicles (6.7 percent) was calculated from the *Nationwide Personal Transportation Survey, 1995*. This percentage was multiplied by the 2000 total number of vehicle miles traveled for an estimate of 184 billion commercial vehicle miles traveled in 2000.

Cost Estimation

Medical, productivity, emergency services, property damage, legal, and non-liability insurance claims processing costs were estimated with SOII occupational injury survivor counts by vehicle type occupied or pedestrian status and costs per crash victim by vehicle type occupied or pedestrian status from Zaloshnja et al. (2003). The costs then were distributed into more detailed categories with the distribution in Miller (1992). Other costs per case and costs in Table 4 are from Miller (1992). These costs were inflated to 2000 dollars using inflators (medical spending per capita, employment cost index, and consumer price index — all items) calculated from the 2002 *Economic Report of the President*. Employer crash costs were adjusted to specific states using ratios of state to national costs. The medical and composite state price adjusters were calculated from the *ACCRA Cost of Living Index*. The wage adjuster was calculated from estimates of personal income per capita by state in the 2001 *Statistical Abstract of the United States*. Costs per employee in Table 8 were calculated using the number of employees by state from the 2001 *Statistical Abstract of the United States*.

Total employer health fringe benefit costs (Figure 1) were computed following the methods in Miller (1992). Sources of data were as follows: sick leave, health and other insurance, and Workers' Compensation per hour worked from Table 701, 2000 *Statistical Abstract of the United States*;

number of workers and average weekly hours worked from Table 580, 2001, *Statistical Abstract of the United States*.

Costs in Table 10 were assigned to non-fatal injuries by vehicle type. These costs were determined in an analysis of highway crash costs (Miller et al., 1996). Fatal crash costs were assigned on a per case basis. The number of employees by industry came from the 2000 Survey of Occupational Illnesses and Injuries (SOII). The wage-risk premium was calculated as an average per worker across all industries. Wage-risk premiums are implicit costs to employers to compensate workers for increased risk levels. Since the premiums are implicit and not a direct monetary cost, they were separated from the other costs. Due to lack of information, costs related to crash-caused traffic delays of commercial vehicles or employees not involved in crashes were not included in the estimate of the total cost of highway crashes to employers.

Employer costs of safety restraint non-use and alcohol-involved motor vehicle crashes were estimated from a combined file from NHTSA's 1999 FARS, NHTSA's 1999 Crashworthiness Data System (CDS), and NHTSA's 1999 General Estimates System (GES). Costs per victim were merged into the file following Zaloshnja et al. (2003). The GES file was

adjusted for under-reporting of alcohol involvement by police through the method described in Blincoe et al. (2002). The costed file was used to estimate employer costs of alcohol-involved injuries and the portion of employer costs per unrestrained victim that can be attributed to restraint non-use. The latter was estimated as a difference between the actual total cost and the hypothetical cost of crashes in the case that all vehicle occupants were restrained. Property damage was kept constant because it is not affected by restraint use. Given that the information on the commercial nature of the vehicle is not available for all vehicles in CDS and GES, a probability model constructed from 1991–99 FARS was used to estimate the probability of a non-fatal injury being work-related in cases when it could not be directly determined. Employer costs of alcohol-involved injuries by state (Table 9) were estimated by assuming that the ratio between employer and societal costs remains the same across the states. Societal costs of alcohol-involved injuries by state were found in Taylor et al. (2002).

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